

Reveo-0192USAAON00  
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In the Claims

1-17. (Canceled)

18. (New) An optical system comprising  
a substrate capable of transmitting light therethrough, and in a direction parallel to major  
surfaces of said substrate;  
an array of routing elements within said substrate configured and positioned to propagate  
light in a fixed or programmable direction; and  
at least one cavity between at least one set of adjacent spheres in said array,  
wherein said cavity is configured and dimensioned to accept functional blocks, thereby  
providing an optical equivalent of a printed circuit board.

19. (New) An optical system comprising  
a substrate capable of transmitting light therethrough, and in a direction parallel to major  
surfaces of said substrate;  
an array of routing elements within said substrate configured and positioned to propagate  
light in a fixed or programmable direction; and  
at least one functional block between at least one set of adjacent spheres in said array,  
thereby providing an optical equivalent of a printed circuit board.

20. (New) An optical system comprising  
a substrate capable of transmitting light therethrough, and in a direction parallel to major  
surfaces of said substrate;  
an array of routing spheres within said substrate configured and positioned to propagate  
light in a fixed or programmable direction; and  
at least one cavity between at least one set of adjacent spheres in said array,

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wherein said cavity is configured and dimensioned to accept functional blocks, thereby providing an optical equivalent of a printed circuit board.

21. The system as in claim 18, wherein said routing elements comprise routing spheres.
22. The system as in claim 21, wherein said routing spheres are fixed in position such that light is routed in one direction.
23. The system as in claim 21, wherein said routing spheres are programmable such that light may be routed in more than one direction.
24. The system as in claim 19, wherein said routing elements comprise routing spheres.
25. The system as in claim 24, wherein said routing spheres are fixed in position such that light is routed in one direction.
26. The system as in claim 24, wherein said routing spheres are programmable such that light may be routed in more than one direction.
27. The system as in claim 20, wherein said routing spheres are fixed in position such that light is routed in one direction.
28. The system as in claim 20, wherein said routing spheres are programmable such that light may be routed in more than one direction.
29. The system as in claim 18, comprising plural cavities between plural pairs of routing elements within said array.
30. The system as in claim 29, wherein said plural cavities are of different configuration or of identical configuration.

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31. The system as in claim 18, wherein said functional block is selected from the group of elements or devices consisting of passive optical elements, active optical elements, null function, optical amplifiers, digital processors, analog processors, optical modulation device, deflection devices, Fourier transform devices, filtering devices, and combinations having at least one of the foregoing elements or devices.
32. The system as in claim 19, comprising plural functional block between plural pairs of routing elements within said array.
33. The system as in claim 32, wherein said plural functional block are of different configuration or identical configuration.
34. The system as in claim 19, wherein said functional block is selected from the group of elements or devices consisting of passive optical elements, active optical elements, null function, optical amplifiers, digital processors, analog processors, optical modulation device, deflection devices, Fourier transform devices, filtering devices, and combinations having at least one of the foregoing elements or devices.
35. The system as in claim 20, comprising plural cavities between plural pairs of routing elements within said array.
36. The system as in claim 35, wherein said plural cavities are of different configuration or of identical configuration.
37. The system as in claim 20, wherein said functional block is selected from the group of elements or devices consisting of passive optical elements, active optical elements, null function, optical amplifiers, digital processors, analog processors, optical modulation device, deflection devices, Fourier transform devices, filtering devices, and combinations having at least one of the foregoing elements or devices.